Standard 6: Recurrence relation: solve by plugging in/unrolling

For standard 6, I failed to solve for and substitute k correctly (among other problems I will talk about in the next paragraph). This resulted with me not simplifying my unrolled solution correctly. After unrolling the recurrence, I should have solved for T(n), but since my substitution was incorrect, my answer for T(n) was also incorrect. K should have been = (n-5)/5. This could have been found by taking the first value after unrolling, 2^kT(n-(5*k)), and solving for k within the T() by suing the base case in the recurrence. By doing this, I would have solved for n-(5k) = 5. Solving for k, I would have gotten k = (n-5)/5.

Unfortunately, even if I had substituted k correctly, I did not recognize (or would not have recognized) the proper ways to simplify and solve for T(n). I should have recognized that the right-hand side addition was a geometric sequence (after the unrolling step). The right-hand side addition was a geometric sequence due to it incrementing by 2^i after every addition. This geometric series would have been evaluated to (1-^{2k})/(1-2).

After substituting this, I would be able to reduce the problem down to the solution by recognizing which values we could exclude due to their size/growth rates. I would then remove all values left on the right side of the recurrence other than $2^{(n-5)/5}$ because that is the only value that needs to be considered. It is the only value that needs to be considered since it is the only value that exponentially grows over time left in the recurrence.

If I had been able to solve for k correctly, identify that the right-hand side addition was a geometric sequence, and simplified the remaining recurrence correctly, I would have successfully completed the problem correctly.

I now understand how to solve for k and how to plug it back into the unrolled recurrence. I also now understand how to identify a geometric sequence and substitute the geometric sequence evaluation back into the unrolled recurrence. Finally, I now understand how to solve the initial recurrence with k and the geometric sequence evaluation plugged back into the unrolled recurrence.